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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,311	06/27/2003	Michael Yatziv	82225P8511	8941

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EXAMINER	
KROFCHECK, MICHAEL C	
ART UNIT	**PAPER NUMBER**
2186	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/10/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/608,311	YATZIV ET AL.	
	Examiner	Art Unit	
	Michael Krofcheck	2186	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendment filed on 1/31/2007.

2. Claims 9, 18, and 27 have been amended.

3. The objections/rejections from the prior correspondence not restated herein have been withdrawn.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-3, 6-7, 10-12, 15-16, 19-21, 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable by Jacobson et al., U.S. Patent Application Publication No. 2004/0068636 (hereinafter Jacobson) which incorporates Jacobson et al., U.S. Patent

No. 5,392,244 (hereinafter Jacobson 2) by reference, Ooe et al., US patent 5737743, and English et al., US patent 5345575.

7. With respect to claim 1, Jacobson teaches of a method comprising: creating a virtual data storage parcel (Figs. 1, 2; paragraphs 0020, 0024; where the controller is arranged to create a virtual storage space. The virtual storage space includes a plurality of virtual storage volumes (virtual data storage parcel)),

the virtual data storage parcel including a number of virtual logical data blocks of a first size (Fig. 2; paragraph 0031; where the blocks in the virtual storage locations include 512 bytes of data);

creating a physical data storage parcel (Fig. 2; paragraph 0024; where the physical storage space includes a plurality of physical storage volumes (physical storage parcel). The physical storage volumes are present; therefore they have been created),

the physical data storage parcels including a number of data blocks of a second size (Fig. 2; paragraph 0031; where the blocks in the physical storage locations include 512 bytes of data); and

mapping the virtual logical data blocks in the virtual data storage parcel to the physical data storage blocks in the physical storage parcel (Figs. 1, 2; paragraph 0029).

Jacobson fails to explicitly teach of the second size being smaller than the first size. However, Ooe teaches of a logical block size is an integer multiple of a physical block (abstract).

Jacobson fails to explicitly teach of the larger size of the virtual logical data blocks provides additional storage space for data of one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data, timestamp data, and cache history data. However, English teaches of wherein the larger size of the virtual logical data blocks provides additional storage space for data of one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data, timestamp data, and cache history data (fig. 3c; column 3, lines 19-26; where the packet (logical block) contains a block of data (physical block), sequence number (timestamp), and a flag).

It would have been obvious to one of ordinary skill in the art having the teachings of Jacobson incorporating Jacobson 2 and Ooe at the time of the invention to make the logical block size of Jacobson an integer multiple of a physical block size as taught in Ooe. Their motivation would have been to reduce the seek count and rotation wait time for the disk (Ooe, column 3, lines 7-11).

It would have been obvious to one of ordinary skill in the art having the teachings of Jacobson incorporating Jacobson 2, Ooe, and English at the time of the invention to include the sequence number/timestamp and flag from the packet of English into the logical block of the combination of Jacobson incorporating Jacobson 2 and Ooe. Their motivation would have been to allow for recovery from system failures and provide for atomic updates of objects (English, column 3, lines 23-26).

8. With respect to claim 2, Jacobson also teaches of, the method further comprising: storing data pertaining to the virtual data storage parcel in one or more of

the physical data storage blocks in the physical data storage parcel (Fig. 2; paragraph 0030; where the host request to write addresses a storage location of a virtual storage volume, and a pointer contains the location in the physical storage location which contains the data written by the host)

wherein a size of the physical data storage parcel exceeds the size of the virtual data storage parcel (Fig. 2; paragraphs 0024, 0031; where the depicted number of volumes which show 5 physical volumes and 3 virtual volumes can be more or less).

9. With respect to claim 3, Jacobson also teaches of wherein data pertaining to the physical data storage parcel includes data of one or more types selected from a list consisting of error correction code data, cyclic redundancy check data, checksum data, timestamp data and cache history data (Fig. 1; paragraph 0022; where the controller uses a RAID 5DP (double parity) storage scheme to store the data. Jacobson 2, Figs. 1, 3; column 3, line 61 – column 4, line 31; where parity data (error correction code data) is stored in one of the 4 physical disks).

10. With respect to claim 10, Jacobson teaches of a data storage system comprising: a storage medium (Fig. 1, item 14; paragraph 0019);

a processing system (Fig. 1, item 12; paragraph 0020); and

a memory, coupled to the processing system (Fig. 1, item 18; paragraph 0023),

the memory having stored therein instructions which, when executed by the processing system, cause the processing system to create a virtual data storage parcel (Figs. 1, 2; paragraph 0020, 0023 – 0024; where the memory stores executable code usable by the controller. The controller is arranged to create a virtual storage space.

The virtual storage space includes a plurality of virtual storage volumes (virtual data storage parcel)),

the virtual data storage parcel including a number of virtual logical data storage blocks of a first size (Fig. 2; paragraph 0031; where the blocks in the virtual storage locations include 512 bytes of data),

create a physical data storage parcel (Fig. 2; paragraph 0024; where the physical storage space includes a plurality of physical storage volumes (physical storage parcel). The physical storage volumes are present; therefore they have been created),

the physical data storage parcel including a number of physical data storage blocks of a second size (Fig. 2; paragraph 0031; where the blocks in the physical storage locations include 512 bytes of data), and

map the virtual logical data storage blocks in the virtual data storage parcel to the physical data storage blocks in the physical data storage parcel (Figs. 1, 2; paragraph 0020, 0029).

Jacobson fails to explicitly teach of the second size being smaller than the first size. However, Ooe teaches of a logical block size is an integer multiple of a physical block (abstract).

Jacobson fails to explicitly teach of the larger size of the virtual logical data blocks provides additional storage space for data of one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data, timestamp data, and cache history data. However, English teaches of wherein the larger size of the virtual logical data blocks provides additional storage space for data of

one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data, timestamp data, and cache history data (fig. 3c; column 3, lines 19-26; where the packet (logical block) contains a block of data (physical block), sequence number (timestamp), and a flag).

11. With respect to claim 11, Jacobson also teaches of wherein the instructions, when executed by the processing system, further cause the processing system to: store data pertaining to the virtual data storage parcel in one or more of the physical data storage blocks in the physical data storage parcel (Fig. 2; paragraphs 0020, 0023, and 0030; where the host request to write addresses a storage location of a virtual storage volume, and a pointer contains the location in the physical storage location which contains the data written by the host),

wherein a size of the physical data storage parcel exceeds the size of the virtual data storage parcel (Fig. 2; paragraphs 0024, 0031; where the depicted number of volumes which show 5 physical volumes and 3 virtual volumes can be more or less).

12. With respect to claim 12, Jacobson also teaches of wherein data pertaining to the physical data storage parcel includes data of one or more types selected from a list consisting of error correction code data, cyclic redundancy check data, checksum data, timestamp data and cache history data (Fig. 1; paragraph 0022; where the controller uses a RAID 5DP (double parity) storage scheme to store the data. Jacobson 2, Figs. 1, 3; column 3, line 61 – column 4, line 31; where parity data (error correction code data) is stored in one of the 4 physical disks).

13. With respect to claim 19, Jacobson teaches of a machine-readable medium containing instructions (Fig. 1; paragraph 0023) which, when executed by a processing system, cause the processing system to perform a method, the method comprising: creating a virtual data storage parcel (Figs. 1, 2; paragraphs 0020, 0024; where the controller is arranged to create a virtual storage space. The virtual storage space includes a plurality of virtual storage volumes (virtual data storage parcel)),

the virtual data storage parcel including a number of virtual logical data storage blocks of a first size (Fig. 2; paragraph 0031; where the blocks in the virtual storage locations include 512 bytes of data);

creating a physical data storage parcel (Fig. 2; paragraph 0024; where the physical storage space includes a plurality of physical storage volumes (physical storage parcel). The physical storage volumes are present; therefore they have been created),

the physical data storage parcel including a number of physical data storage blocks of a second size (Fig. 2; paragraph 0031; where the blocks in the physical storage locations include 512 bytes of data); and

mapping the virtual logical data storage blocks in the virtual data storage parcel to the physical data storage blocks in the physical data storage parcel (Figs. 1, 2; paragraph 0029).

Jacobson fails to explicitly teach of the second size being smaller than the first size. However, Ooe teaches of a logical block size is an integer multiple of a physical block (abstract).

Jacobson fails to explicitly teach of the larger size of the virtual logical data blocks provides additional storage space for data of one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data, timestamp data, and cache history data. However, English teaches of wherein the larger size of the virtual logical data blocks provides additional storage space for data of one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data, timestamp data, and cache history data (fig. 3c; column 3, lines 19-26; where the packet (logical block) contains a block of data (physical block), sequence number (timestamp), and a flag).

14. With respect to claim 20, the combination of Jacobson incorporating Jacobson 2 and Ooe teaches all of the limitations of the parent claim as discussed supra. Jacobson also teaches of wherein the method further comprising: storing data pertaining to the virtual data storage parcel in one or more of the physical data storage blocks in the physical data storage parcel (Fig. 2; paragraph 0030; where the host request to write addresses a storage location of a virtual storage volume, and a pointer contains the location in the physical storage location which contains the data written by the host);

wherein a size of the physical data storage parcel exceeds the size of the virtual data storage parcel (Fig. 2; paragraphs 0024, 0031; where the depicted number of volumes which show 5 physical volumes and 3 virtual volumes can be more or less).

15. With respect to claim 21, the combination of Jacobson incorporating Jacobson 2 and Ooe teaches all of the limitations of the parent claim as discussed supra. Jacobson also teaches of wherein data pertaining to the physical data storage parcel includes

data of one or more types selected from a list consisting of error correction code data, cyclic redundancy check data, checksum data, timestamp data and cache history data (Fig. 1; paragraph 0022; where the controller uses a RAID 5DP (double parity) storage scheme to store the data. Jacobson 2, Figs. 1, 3; column 3, line 61 – column 4, line 31; where parity data (error correction code data) is stored in one of the 4 physical disks).

16. With respect to claims 6, 15, and 24, the combination of Jacobson incorporating Jacobson 2 and Ooe teaches all of the limitations of the parent claims as discussed supra. Jacobson 2 teaches of wherein the virtual data storage parcel includes less virtual logical data blocks than the physical data storage parcel (column 7, lines 59 – 64).

Jacobson fails to specifically teach of eight virtual logical data blocks and nine data storage blocks.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use eight virtual logical data blocks and nine physical logical data storage blocks since it has been held that relative dimensions are not patentably distinct. *Gardner v. TEC Systems, Inc.*, 220 USPQ 777 (Fed. Cir. 1984). In addition, the applicant states in paragraph 0018 and 0019 that the number of data blocks in the physical and virtual data storages parcels may vary.

17. With respect to claims 7, 16, and 25, the combination of Jacobson incorporating Jacobson 2 and Ooe teaches all of the limitations of the parent claims as discussed supra. Jacobson also teaches of wherein the nine physical data storage blocks are

each 512 bytes in length (paragraph 0031; where the blocks of the physical storage system comprise 512 bytes of data).

18. Claims 4, 13, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobson incorporating Jacobson 2, Ooe, English, and Peterson et al., U.S. Patent No. 5,911,150 (hereinafter Peterson).

19. With respect to claims 4, 13, and 22, Peterson teaches of wherein each virtual logical data block includes system data as well as data pertaining to the system data of the respective virtual logical data block (Figs. 10, 11; column 6, lines 10 – 33; where the Host Block Header (system data) and logical block data (data pertaining to the system data) make up a logical block).

It would have been obvious to one of ordinary skill in the art having the teachings of Jacobson, Jacobson 2, Ooe, English and Peterson at the time of the invention to incorporate the Host Bock Header from the logical blocks of Peterson into the virtual storage blocks of the combination of Jacobson incorporating Jacobson 2, Ooe, and English. The motivation for this would have been to separate and define the logical blocks (Peterson, column 6, lines 10 – 22).

20. Claims 5, 14, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobson incorporating Jacobson 2, Ooe, English, and Peterson as applied to claims 4, 13, and 22 respectively, and further in view of Itoh et al., U.S. Patent No. 5,966,720 (hereinafter Itoh).

With respect to claims 5, 14, 23, Itoh teaches of wherein the data pertaining to the virtual logical data block includes data of one or more types of data selected from

the list consisting of error correction code data, cyclic redundancy check data, checksum data, timestamp data and cache history data (Fig. 1; column 2, lines 60 – 62; column 3, lines 14 – 23; where the sectors within each block are addressed by logical addresses assigned to them and not their physical address. When data is written to the sectors, cyclic redundancy check data is also written into each sector).

It would have been obvious to one of ordinary skill in the art having the teaching of Jacobson incorporating Jacobson 2, Ooe, English, Peterson, and Itoh at the time of the invention to include the cyclic redundancy check data from Itoh in the virtual blocks of the combination of Jacobson incorporating Jacobson 2, Ooe, English, and Peterson. The motivation for this would have been to enable correction of the error in 1 bit and the detection of the error in 2 bits (Itoh, column 3, lines 22 – 24).

21. Claims 8, 17, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobson incorporating Jacobson 2, Ooe, English, and Cleveland et al., U.S. Patent No. 5,325,370, (hereinafter Cleveland).

22. With respect to claim 8, 17, 26, Cleveland teaches of wherein the size of each virtual logical data block varies within a data storage system (Fig. 9; column 8, lines 29 – 47; where the data blocks are logical entities (virtual logical data blocks) which may have different lengths).

It would have been obvious to one of ordinary skill in the art having the teachings of the combination of Jacobson incorporating Jacobson 2, Ooe, and English, and Cleveland at the time of the invention to incorporate the variable logical data block sizes from the virtual storage of Cleveland to virtual bock sizes in the virtual storage system of

the combination of Jacobson incorporating Jacobson 2, Ooe, and English. The motivation for this would have been to more efficiently store data in the system (Cleveland, column 1, line 65 – column 2, line 1, column 2, line 59 – column 3, line 11).

23. Claims 9, 18, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobson incorporating Jacobson 2, Ooe, and English.

24. With respect to claim 9, 18, 27, English teaches of determining a number of physical data storage blocks based upon consideration of size overhead and performance overhead (column 3, lines 27-41; where an amount of reserve storage is available for future allocation to ensure that a storage location is always available. This directly relates to the number of physical blocks. The reserve amount when 5% allows for through put of half the nominal bandwidth, while at a reserve of 50%, the speed approaches the nominal bandwidth).

It would have been obvious to one of ordinary skill in the art having the teachings of Jacobson incorporating Jacobson 2, Ooe and English at the time of the invention to incorporate the process of maintaining a variable reserve of physical blocks as taught in English into the combination of Jacobson incorporating Jacobson 2, Ooe, and English. The motivation for this would have been to provide better performance and ensure that there is always available storage (English, column 3, lines 27-41).

Response to Arguments

25. Applicant's arguments filed 1/31/2007 have been fully considered but they are not persuasive.

26. In response to applicant's arguments against the references individually, specifically Jacobson, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

27. The applicant argues with respect to claims 1, 10, and 19, that the combination of Jacobson, Ooe, and English fails to teach that, "the larger size of the virtual logical data blocks provides additional storage space." The examiner disagrees. Ooe teaches of a logical block size that is an integral multiple of a physical block size (Ooe, abstract, column 2, lines 30-36, column 5, lines 39-41). Since the logical blocks are larger than a physical block, they must provide additional storage space.

The applicant also argues that the "extra information" mentioned in English column 3, lines 19-26 is not additional storage space as claimed but "simply additional information included in the existing structure of each data packet." The examiner disagrees. The extra information is part of the data packet and thus must be stored as a part of the packet, else it would not be a part of the packet. Where ever it is stored can be called storage space since it stores the extra information. If the extra information were to be included in the structure of the packet as the applicant contends, then it must be in additional storage space since it is not in the typical storage space within the packet.

Conclusion

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

29. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Krofcheck whose telephone number is 571-272-8193. The examiner can normally be reached on Monday - Friday.

31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael Krofcheck

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